

**STATE OF CALIFORNIA
CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LOS ANGELES REGION**

ORDER NO. R4-2004-XXXX

**WASTE DISCHARGE REQUIREMENTS
FOR
THE BOEING COMPANY SANTA SUSANA FIELD LABORATORY
(FILE NO. 04-022)**

The California Regional Water Quality Control Board, Los Angeles Region (Regional Board) finds:

1. The Boeing Company (Discharger) Santa Susana Field Laboratory (SSFL) is a 2,850-acre facility located in the Santa Susana Mountains, in the southeast corner of Ventura County, approximately 29 miles northwest of Los Angeles (Figure 1).
2. Title 27 of the California Code of Regulations (27 CCR), section 20250(b)(5) requires that Regional Boards shall specify in Waste Discharge Requirements the elements of land treatment programs by dischargers who treat or dispose of wastes in land treatment waste management units. On August 28, 2003, the Los Angeles Regional Water Quality Control Board (Regional Board) received the Application/Report of Waste Discharge (ROWD), to apply for individual waste discharge requirements for operation of land treatment units (LTUs) at SSFL. The ROWD was determined to be complete on February 20, 2004.
3. Building areas 359, 376, and 316 are the specific sites (Site) within SSFL boundaries to be remediated pursuant to these waste discharge requirements (WDRs) (See Figure 2.) Building sites are delineated for location only, as they have been previously removed.

SITE HISTORY

4. The SSFL has been active since 1948. Prior to use as a rocket engine testing facility, the land was used for ranching and grazing. The main activities at SSFL were research, development, and testing of rocket engines and related components. Solid propellants, including perchlorate compounds, were primarily used, stored and tested at two locations within the Site: Building 359 and the Happy Valley sites (Figure 3).
5. Resolution No. 59-68 issued by this Regional Board in 1959 regulated the disposal of sewage and industrial waste at SSFL. SSFL stopped actively discharging sewage and industrial waste, and upon request from Rockwell International (the owner of SSFL at that time), this Regional Board rescinded Resolution No. 59-68 in 1994.

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6. The Boeing Company discharges waste to surface waters from SSFL under waste discharge requirements which serve as a National Pollutant Discharge Elimination System (NPDES) permit, contained in Order No. 98-051 adopted by this Regional Board on June 29, 1998 (NPDES Permit No. CA0001309). Boeing has applied for renewal of its NPDES permit, proposed requirements were developed, submitted for public comment, and are scheduled for consideration at the April 1, 2004 Regional Board Meeting.
7. Pursuant to title 33 of the Code of Federal Regulations parts 320 through 330 et seq., discharges of dredged or fill material into waters of the United States must have 401 and 404 permit authorization. The SSFL received 401 permit authorization for the Happy Valley area by this Regional Board on September 27, 2003 (File No. 03-118) and received 404 permit authorization by the Army Corps of Engineers on September 30, 2003 (File No. 2003-01317-AJS). Perchlorate impacted soils from the Happy Valley drainage areas have been excavated under 401/404 certification, and are now stockpiled in the Building 359 area (Figure 4). While stockpiled, the soils are protected and covered with high-density polyethylene sheeting to prevent impact to surface water from precipitation. The areas in Happy Valley that have been excavated will be backfilled with soil from the Borrow Pit, an area which has been determined to contain clean soil, and has been approved by the Department of Toxic Substances Control (DTSC). If necessary, soil amendments will be added to backfill material to promote the biotreatment of any residual perchlorate present in the shallow soils.
8. Beginning in 1989, the first phase of the Federal Resource Conservation and Recovery Act (RCRA) corrective measures, the RCRA facility assessment, was conducted for the U.S. Environmental Protection Agency, and the report finalized by the Science Applications International Corporation in 1994. One hundred twenty two areas of concern (AOCs) were identified at SSFL where various hazardous materials had been used, stored, or handled. The program is currently in the RCRA facility investigation (RFI) stage. AOCs have been grouped into 50 RFI sites. DTSC is the lead agency for assessment and cleanup at the Boeing SSFL site.
9. Since 1997, perchlorate characterization has been conducted at SSFL in soil and groundwater, and conducted on surface water since 1998. Over 1,600 samples were collected and analyzed. Perchlorate has been detected (other than a few isolated and non-repeatable detections in surface water and groundwater) at or near four main areas which are the Building 359, Happy Valley, the former Sodium Disposal Facility (FSDF) and Compound A RFI sites (Figure 5).
10. Surface water is monitored at eight outfall locations at SSFL. One of these locations is monitored in the Happy Valley area. Surface water runoff from the eastern portion of SSFL drains approximately east and south, and into the San Fernando Valley, near the Chatsworth reservoir.

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11. Recent detections of perchlorate in groundwater at various locations around the state prompted the State Water Resources Control Board to request information from facilities throughout the state that may have used or handled perchlorate.
12. The Regional Board issued such a request to Boeing in a letter dated December 23, 2002, based upon detections of perchlorate in groundwater and monitoring wells in the City of Simi Valley since 1999. A report entitled *Perchlorate Source Evaluation and Technical Report, Santa Susana Field Laboratory* (Evaluation Report) was submitted to this Regional Board on February 3, 2003. This report indicated that SSFL is not the source of perchlorate to groundwater in Simi Valley.
13. Subsequent to the Evaluation Report, another report, the *Happy Valley Interim Measure Work Plan Addendum and Amendment, Happy Valley Building 359 Areas of Concern, Santa Susana Field Laboratory* dated August 2003 was submitted by Montgomery Watson Harza (MWH) to this Regional Board.
14. Soils contaminated with perchlorate, where identified and left unmitigated, are considered to be an ongoing discharge of waste that could affect the quality of the waters of the state, as defined in section 13260 of the California Water Code.
15. In order to assure compliance with the water quality objectives of the NPDES permit for SSFL, and to assure that surface water runoff is not impacted, the Discharger has applied for WDRs for excavation, removal, and treatment of the soil at the Site. However, the FSDF and Compound RCRA facilities do not pose a threat to surface water quality and are not addressed by this Order.
16. A report entitled *Work Plan for the Biotreatment of Perchlorate in Soil and Sediment, Happy Valley Interim Measures Project, Santa Susana Field Laboratory, Ventura County, California* (Biotreatment Report), dated December 2003 was submitted by MWH to this Regional Board. The Biotreatment Report identifies the areas to be treated, describes the specific biotreatments (treatment) and measures to be taken, the time periods for treatment in-situ (in place) and ex-situ (removed from in place), and the monitoring and reporting to evaluate whether target levels of perchlorate have been achieved. The Biotreatment Report was approved by DTSC on March 5, 2004.

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LAND TREATMENT

17. Land treatment of soils provides a means of remediating the soil contaminated with perchlorate.
18. The Biotreatment Report proposes remediation of soils impacted with perchlorate through bioremediation. In-situ soils at the Site impacted with perchlorate will be biotreated down to a depth of approximately three feet at Building 359 and Building 376, and one foot at Building 316. All ex-situ materials at the Site will be biotreated. Both in-situ and ex-situ treatments will use the same methods of treatment. The

proposed method of treatment uses the application of chemical compounds (nutrients) to cause indigenous soil bacteria to reduce the perchlorate to chloride and water.

19. In order to cultivate an environment conducive to microbial growth, optimal conditions require soils be kept moist and at field capacity. Soils will not be oversaturated, which would allow water to percolate to lower depths in the vadose zone, and potentially to groundwater underlying the area at approximately 160 feet below ground surface.
20. Field capacity (the amount of water contained in the soil at saturation) has been determined from soil samples taken at SSFL. Total moisture content that is required for the treatment has been calculated for each building area.
21. A moisture-sampling program is to be implemented. The objective of the moisture-sampling program is to determine the moisture content within the treatment zone to evaluate whether the estimated volume of water applied to achieve the field capacity is accurate, as well as to evaluate the moisture-saturated depth so that the appropriate water is applied. Hand auger samples will be taken from the in-situ treatment areas to be tested for moisture content and bulk density analysis. Soil samples will be taken at 12 different locations at two different depths for a total of 24 soil samples. Additionally, 12 soil sampling locations will be selected for qualitative evaluation of the moisture content in the field (i.e., the wetting front in the soil samples will be visually observed to ensure that treatment depth is not exceeded). Selection of the qualitative soil sampling locations will be biased towards locations in the southern portion of the treatment area where bedrock occurs at a shallower depth.
22. Although it is unlikely that perchlorate could migrate to the water table, groundwater monitoring will be provided to evaluate this migration pathway. Specifically, potassium bromide will be added as an amendment to the treatment zone at the rate of 300 pounds per acre (approximately 600 pounds total), and used as a conservative tracer¹ for potential migration through the vadose zone from the treatment area. Groundwater quality will be monitored by collecting samples for chemical analysis from piezometers PZ-067, PZ-068, and PZ-003, from shallow well RS-2, and from deep wells RD-73, RD-77, HAR-24, and HAR-25 (locations shown on Figure 6). Piezometers and shallow well RS-2 may be dry depending on seasonal fluctuations. Groundwater samples will be chemically analyzed for bromide ions (inductively coupled plasma – mass spectroscopy (ICP-MS)) and perchlorate (EPA Method 314.0) on a quarterly basis for one year.

¹ Conservative tracers have chemical and transport properties similar to those of microbiologically reactive chemicals (i.e. calcium magnesium acetate) but are not microbiologically reactive themselves. Thus, conservative tracers are immune to chemical changes produced by biologic activity—such as volatilization, sorption, and dilution. Therefore, either the presence or lack of potassium bromide in groundwater samples would indicate either impact or no impact to groundwater from the treatment areas, respectively.

23. Treatment of the soils will involve the application of two chemical products: methyl soyate (a biodiesel, produced from soy oil and methanol), and calcium magnesium acetate (CMA), a common road salt. Geosyntec, consultants to Boeing, tested both substances in a bench-scale study with soils from SSFL, which indicated that perchlorate levels should decrease to less than 4 parts per billion in the soil using such compounds. Methyl soyate and CMA are also degraded by the biological activity. A summary of treatment amendments is provided in Table 1.

TABLE 1
SUMMARY OF TREATMENT AMENDMENT APPLICATION
BIOTREATMENT PROGRAM
Santa Susana Field Laboratory

| Location | Treatment Media | Treatment Area (ft ²) | Treatment Volume (cy) | Amendment(s) | Application Rate | Total Amendment Requirement |
|--------------|-----------------|-----------------------------------|-----------------------|---------------|--------------------|-----------------------------|
| Building 316 | in-situ soil | 10,925 | 405 | methyl soyate | 149 gallons/acre | 14 gallons |
| | | | | CMA* | 0.78 pounds/cy** | 316 pounds |
| Building 316 | ex-situ soil | 10,925 | 1,010 | methyl soyate | 1 gallon/400 sf*** | 67 gallons |
| Building 376 | in-situ soil | 3,606 | 400 | methyl soyate | 149 gallons/acre | 14 gallons |
| | | | | CMA | 0.78 pounds/cy | 312 pounds |
| Building 359 | in-situ soil | 81,920 | 9,100 | methyl soyate | 149 gallons/acre | 300 gallons |
| | | | | CMA | 0.78 pounds/cy | 7,098 pounds |
| Building 359 | ex-situ soil | 81,920 | 12,990 | methyl soyate | 1 gallon/400 sf | 855 gallons |

*CMA - calcium magnesium acetate

**cy - cubic yard

***sf – square foot

IN-SITU SOIL TREATMENT

24. In-situ soil treatment will performed at the Building 316, 376, and 359 Areas. An application of methyl soyate will be spread as uniformly as possible over the surface of the ground in liquid form. Agricultural equipment designed for applying liquid

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agricultural amendments will be used, as well as other technical measures to achieve uniformity. Methyl soyate will be spread approximately at 0.125 liters/square yard to achieve a target concentration of 0.106 kilograms/cubic yard of soil (for an average treatment depth of three feet). Methyl soyate will help control dust during the soil tilling process that occurs following application of the amendments, is immiscible in water, and will tend to remain in the shallower portion of the treatment layer.

25. Following application of the methyl soyate, CMA will also be applied to the surface of the treatment areas, at the rate of approximately 3,500 lbs/acre. CMA will be spread as evenly as possible, using equipment designed to apply granular fertilizer. CMA is extremely soluble in water, and has been demonstrated to increase the permeability of soils by a factor of 2 to 20 times depending on the soil type, when present at concentrations of 1,000 to 5,000 milligrams per liter (mg/L). CMA will enhance the permeability of the surficial soils, and with its solubility in water, penetrate the full 3 feet treatment depth with the wetting front.
26. Following the application of CMA, the soil will be tilled, and water will be applied until field capacity is reached. The Biotreatment Report indicated that field capacity has been determined from site specific data.

EX-SITU SOIL TREATMENT

27. As described in the Biotreatment Report, ex-situ treatment shall be performed at the Building 359, 376, and 316 and areas. Soils will be spread in one- to two-foot thick lifts, and each lift treated in the same manner as described above for in-situ treatment.
28. Any specific areas within the Site that are not included in this Order, but which may need treatment, may only be treated after submittal of a workplan and subsequent approval by the Regional Board Executive Officer (Executive Officer).
29. It is anticipated that the initial dose of the applied methyl soyate and CMA amendments will be adequate to lower perchlorate concentration to the target level. As submitted in the Biotreatment Report, it is possible that after treatment, low residual levels of perchlorate may remain, and citric acid can be used as an additional treatment amendment in liquid form and applied to the soil. However, citric acid or any additional soil amendments not described in detail in this order must be submitted in a report for Executive Officer approval before treatment can be applied.

REGULATORY REQUIREMENTS

30. The Discharger has been regulated under a National Pollutant Discharge Elimination System (NPDES) permit since 1984, and is currently enrolled under NPDES No. CAA0001309.
31. Incorporated herein as Attachment A, DTSC (the lead agency) provided a Notice of Exemption on September 22, 2003, based on findings pursuant to title 14, California

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Code of Regulations (14 CCR), section 15061 (b)(3), which show that there will be no significant impact to water quality.

32. However, for the purposes of water quality, this Regional Board has assumed lead-agency role for this soil amendment project under the California Environmental Quality Act (Public Resources Code section 21100 et seq.). An Initial Study has been conducted in accordance with 14 CCR section 15063 for the State CEQA Guidelines and section 15000, et seq. Based upon the Initial Study, Regional Board staff prepared a mitigated Negative Declaration that the project as mitigated will not have a significant adverse effect on the environment.
33. These WDRs are not intended to alter any arrangements of cleanup with other existing enforcement agencies.

ADMINISTRATIVE MATTERS

34. On June 13, 1994 this Regional Board adopted a revised *Water Quality Control Plan for the Coastal Watersheds of Los Angeles and Ventura Counties* (Basin Plan) which was amended on January 27, 1997 by Regional Board Resolution No. 97-02. The Basin Plan contains water quality objectives and beneficial uses for groundwater and surface waters of the San Fernando Groundwater Basin, which lies immediately to the east of SSFL. The designated beneficial uses include municipal, domestic and agricultural supply, industrial service and process supply. The requirements contained in this Order, as they are met, will be in conformance with the goals of the Basin Plan.

This Regional Board has notified the Discharger and interested agencies and persons of its intent to adopt waste discharge requirements for this discharge and has provided them with an opportunity to submit their written views and recommendations.

This Regional Board in a public meeting heard and considered all comments pertaining to the discharge and to the tentative requirements.

Pursuant to California Water Code section 13320, any aggrieved party may seek review of this Order by filing a petition with the State Board. A petition must be received by the State Water Resources Control Board, P.O. Box 100, Sacramento, California, 95812, within 30 days of the date this Order is adopted.

IT IS HEREBY ORDERED, that the Boeing Company (Discharger) Santa Susana Field Lab shall comply with the following at the land treatment units:

A. Specifications

1. The WDRs contained in this Order shall regulate land treatment pursuant to title 27 of the California Code of Regulations (27 CCR), section 20377

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(et seq.). A Monitoring and Reporting Program specific to this Order is attached (Attachment T).

2. Only materials from the Site are to be treated at the Site. Treatment of soils shall be within the boundaries of the proposed Building 359, 376, and 316 areas. Any other areas within SSFL to be treated or other methods to be employed not included in this Order must be submitted to this Regional Board for the Executive Officer's approval.
3. The land treatment process, which includes the addition of water and nutrients to the soil in the treatment zone, shall be conducted in such a manner that no contaminants are released to surface waters or groundwater.
4. Neither the disposal nor handling of soils at this landfill shall create nuisance or pollution, as defined in section 13050 of the California Water Code (CWC).
5. The maximum depth of the treatment zone shall not exceed six feet from the initial soil surface.
6. No water shall be used at the Site except for surface dust control or in the purpose of maintain optimum moisture content in the treatment units. Such water shall not be allowed to pond or create run off at the Site.
7. During the land treatment operations, precipitation and drainage controls shall be maintained as specified pursuant to 27 CCR section 20365. Surface runoff from the drainage area tributary to this Site shall be prevented from passing over or percolating through the treatment zone. Adequate facilities shall be provided to divert all surface runoff from storms away from the treatment area. Water falling on the treatment units shall be contained thereon, or sent to the onsite treatment facility.
8. The handling, treatment, storage, or disposal of these wastes shall cause no condition of pollution or nuisance.

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B. Provisions

1. In accordance with Section 13260 of the CWC, the Discharger shall file a report of any material change or proposed change in the character, location or volume of the discharge.
2. At any time should monitoring results indicate that moisture from the soil treatment may impact groundwater, all application of moisture shall cease. The Discharger shall notify this Regional Board immediately, and within 7 days submit a workplan for Executive Officer approval to prevent moisture from reaching groundwater.

3. The Discharger shall notify this Board immediately by telephone of any adverse condition resulting from this discharge or from operations producing this waste discharge, such notifications to be affirmed in writing within one week from the date of such occurrence.
4. In the event of any change in name of operator or in control or ownership of land or waste disposal facilities owned or controlled by the Discharger, the Discharger shall:
 - a. Notify this Regional Board in writing of such a change; and
 - b. Notify the succeeding owner or operator by letter, a copy of which shall be filed with this Regional Board, of the existence of this order.
5. This Regional Board considers the Discharger to have continuing responsibility for correcting any problems which may arise in the future as a result of this waste discharge or water applied to this property during subsequent use of the land for other purposes.
6. This Order does not exempt the Discharger from compliance with any other laws, regulations, or ordinances which may be applicable, and it leaves unaffected any further restraints on those facilities which may be contained in other statutes or required by other agencies.
7. This Order is not intended to stop or redirect any investigation or mitigation activities not required by this Order but ordered by this Regional Board or other agency.
8. This Order includes the attached Standard Provisions Applicable to Waste Discharge Requirements (Standard Provisions), adopted November 7, 1990 (Attachment W), which are incorporated herein by reference. If there is any conflict between provisions stated herein and the Subtitle-D regulations or Standard Provisions, these provisions stated herein will prevail.
9. In accordance with CWC section 13263(g), these requirements shall not create a vested right to continue to discharge. All discharges of waste into the waters of the state are privileges, not rights, and are subject to rescission or modification.
10. The filing of a request by the Discharger for the modification, revocation and reissuance, or termination of this Order or notification of planned changes or anticipated noncompliance does not stay any condition of this Order.
11. The provisions of this Order are severable, and if any provision of this Order, or the application of any provision of this Order to any circumstance, is held

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invalid, the application of such provision to other circumstances, and the remainder of this Order, shall not be affected thereby.

12. This Order becomes effective on the date of adoption by this Regional Board.

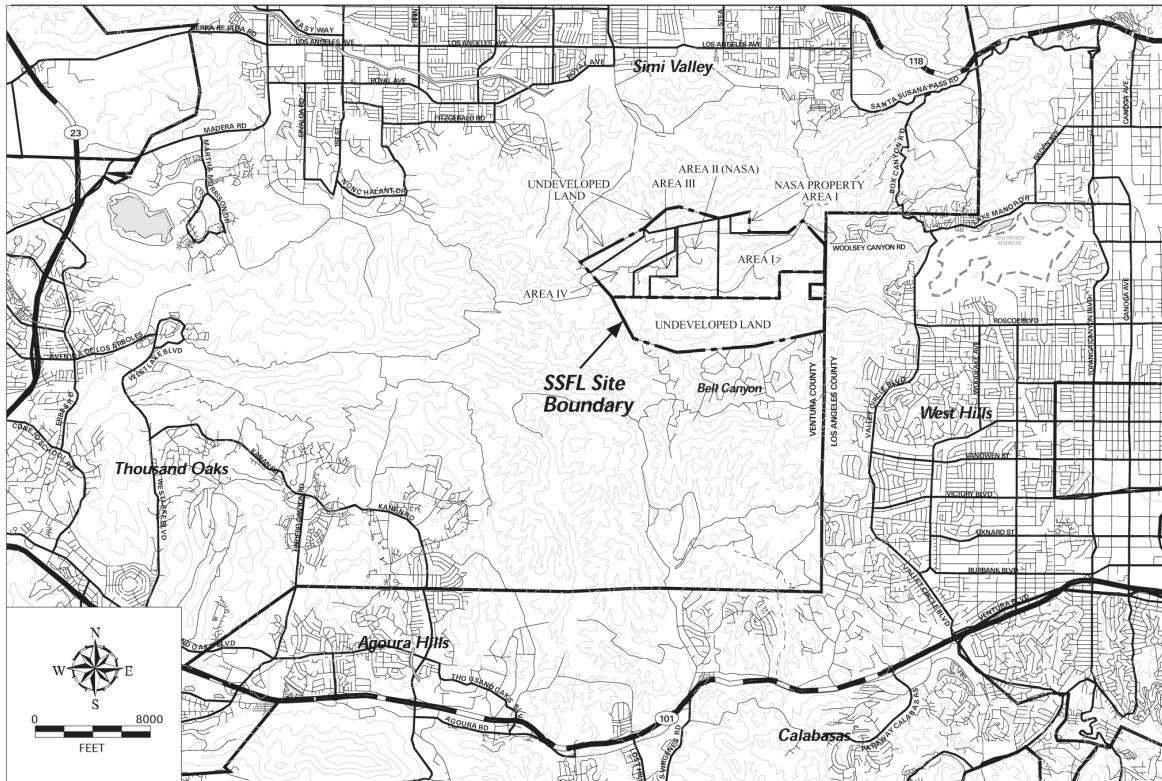
I, Dennis A. Dickerson, Executive Officer, do certify that the foregoing is a full, true, and correct copy of an order adopted by the California Regional Water Quality Control Board, Los Angeles Region, on May 6, 2004.

Dennis A. Dickerson
Executive Officer

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FIGURE 1:

SANTA SUSANA FIELD LABORATORY LOCATION MAP



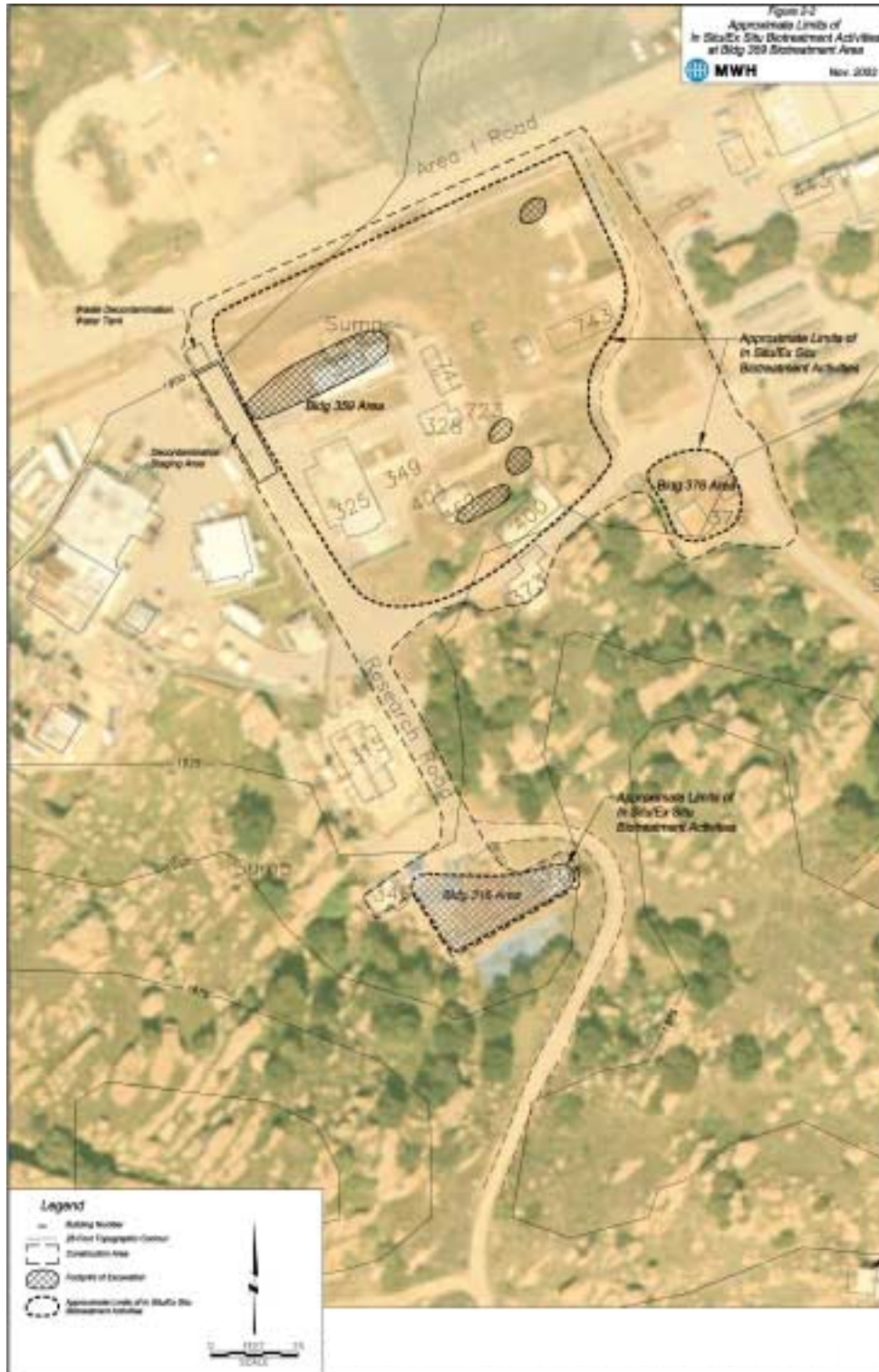
Regional Location Map
 Santa Susana Field Laboratory

FIGURE
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FIGURE 2:
SITE REMEDIATION



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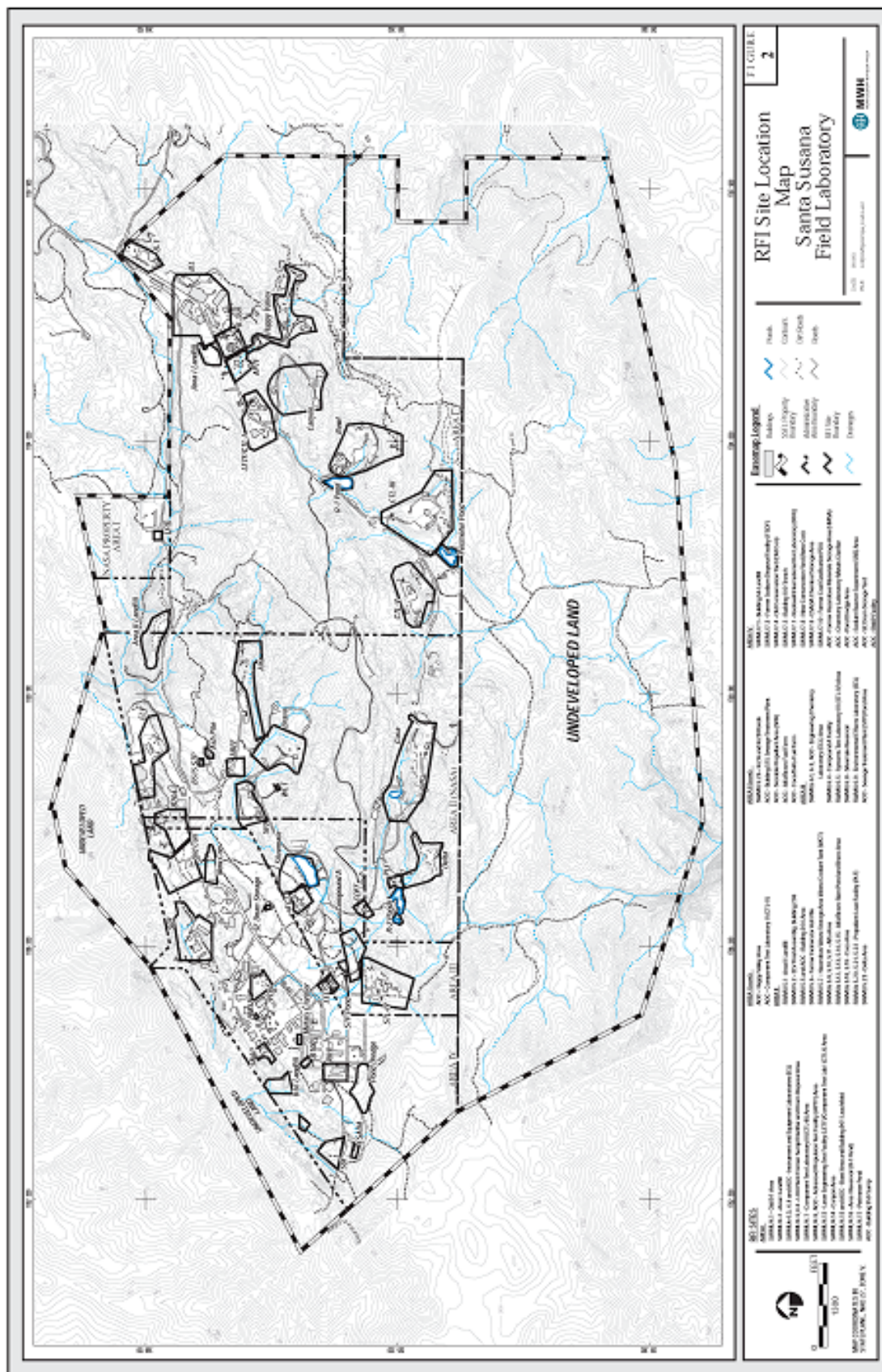


FIGURE 4:
SITE STOCKPILES



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**FIGURE 5:
SITE STOCKPILES**



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